

MEMORANDUM

TO: City of Baltimore

FROM: Andrew Baker, Jason Mumm

SUBJECT: Response to DOJ request regarding Billing
Data Analysis for WARi

DATE: 4 December 2015

The following memorandum was prepared in response to a request from DOJ for clarification on the process used to associate the City's billing data with specific census tracts.

This process was completed in two major steps; the first a GIS and database exercise to associate individual residential accounts with a census tract, and the second to aggregate and summarize that billing data into an annual average bill for each census tract. The WARi Affordability Model, transmitted as an electronic attachment to this memorandum, includes the spreadsheets used for this second step of the process.

Sources of Data

- Billing data, from FY 2012 through FY 2014.
- City GIS data, including meter locations for all City customers
- Census tract GIS data, US Census Bureau TIGER geodatabase

Analytical Process

Step 1: Associate Meter Account Locations with Census Tracts

Individual meter account locations, based on the City's GIS data, were intersected with the US Census Bureau's TIGER feature class for census tracts, appending the geoID of each census tract to each meter account number. This step was performed with ESRI's ArcGIS, and the data was then exported to an MS Access table.

Step 2: Join Census Tract Data to Billing Records

The census tract geoID was joined to the the City's detailed billing data, from FY 2012 to FY 2014, based on the account ID. This step was performed with MS Access.

Step 3: Summarize Billing Data by Census Tract

The billing data was summarized by Census Tract in MS Access, creating three separate tables – one each for sewer, water, and stormwater. Only residential accounts were included in the data tables, with Single Family and Multifamily customer classes grouped separately. The revenue value included in the tables was an annual average for the three years of billing data.

Once exported to Excel, these three tables were imported in to the WARi Affordability Model as the following sheets:

- WW Average Bill Calc
- Water Average Bill Calc
- SW Average Bill Calc

Step 4: Data Validation

Because of the number of multifamily accounts, we cannot assume that the number of accounts is equal to the number of households. Particularly in the dense downtown areas, such an assumption would be non-conservative, as it would neglect the lower cost per household that is typical of multifamily water and sewer use. However, the City's data for number of units by account is infrequently updated, and cannot be relied upon. On this basis the preferred assumption for number of households is from the most recent American Community Survey census data (5 year dataset, 2013).

Three checks were applied to each census tract to evaluate whether this assumption held well – any tract failing a check was reviewed in more detail.

1. Household Discrepancy: As an initial screening, a comparison of number of accounts was made to number of households. Any tract in which the number of households (per the Census) exceeded 75% of the number of accounts was flagged.
2. SFR Average Bill Check: Any tract in which the average bill (based only on the Single Family Residential data) was greater than one standard deviation from the average was flagged.
3. MFR Average Bill Check: Any tract in which the average bill based on Multifamily Residential data exceeded 125% of the average bill for single family in that tract was flagged.

If it was determined that there was a significant inconsistency between the billing records and the census data, the weighted average bill was used in lieu of a tract-specific value. An explanation for each census tract excluded in this manner is included in the Comments field of the aforementioned sheets in the WARi Affordability Model.

WARi Affordability Model

The WARi Affordability Model is provided in response to the request for a working spreadsheet version of the analysis performed. This analysis is based on a proprietary model developed by MWH Global, so is being submitted as Confidential Business Information (CBI) under 40 CFR 2. The City is providing this proprietary CBI solely for use by Gail Coad of Industrial Economics, Inc., to assist in her understanding of the City's analysis in the context of her engagement as a consultant to the United States in the City's matter. We understand that Ms. Coad acts subject to a confidentiality agreement not to publicly disclose or otherwise use information she receives as a result of this engagement except as necessary in performing her contracted duties.